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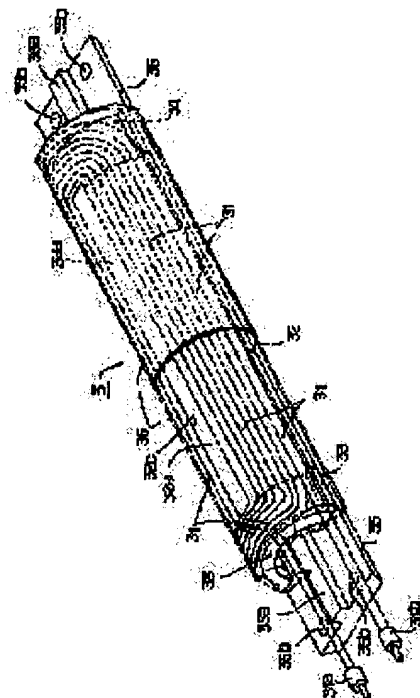
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(54) EXCITING COIL, FIXING DEVICE, AND IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To effectively heat a heated body, to longitudinally equalize surface temperature of the heated body, and to improve mass productivity with a simple structure to reduce a cost, in an exciting coil provided close to the heated body and causing an induction current to the heated body to cause heat to it, and thereby, to improve performance and reduce cost of both an electromagnetic induction heating type fixing device and an image forming device with the fixing device.

SOLUTION: This exciting coil 31 is provide close to a heated body and causes an induction current to the heated body to cause heat to it. A coil wire of the exciting coil 31 is wound flatwise and deformed along a curved surface shape of the heated body, while magnetic cores 33, 34 are provide on the opposite side of the heated body side in both longitudinal end parts of the exciting coil 31 along the curved surface of the exciting coil 31.



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CLAIMS

[Claim(s)]

[Claim 1] The exiting coil which is an exiting coil which makes a heated object produce the induced current and makes it generate heat, what rolled the coil wire rod superficially is made to meet the curved-surface configuration of a heated object, is made to approach a heated object, to be arranged and to have deformed, and is characterized by arranging the magnetic-substance core so that an opposite side may be met at the curved surface of an exiting coil with the heated object side of the longitudinal direction both ends of this exiting coil.

[Claim 2] It is fixing equipment characterized by to be arranged a magnetic-substance core so that make that around which it is fixing equipment which carries out melting fixing of the toner picture which was equipped with the following and was formed on record material of electromagnetic-induction generation of heat of a heated object, and the exiting coil wound the coil wire rod superficially meet the curved-surface configuration of a heated object, make it deform, a heated object approaches, it is arranged and the heated object side of the longitudinal direction both ends of this exiting coil may meet an opposite side at the curved surface of an exiting coil Heated object. The exiting coil which makes a heated object produce the induced current and makes it generate heat.

[Claim 3] It is fixing equipment according to claim 2 characterized by for a heated object being body of revolution in the air, and for an exiting coil approaching a hollow inside and arranging it within this body of revolution.

[Claim 4] An exiting coil is fixing equipment according to claim 2 or 3 characterized by making what wound the coil wire rod around the Kakumaru square configuration superficially by using a rectangular parallelepiped as the heart meet the curved-surface configuration of a heated object, making it come to deform, approaching a heated object, and being arranged.

[Claim 5] It has the fixing roller and pressurization roller which the pressure welding is carried out and can rotate freely on a front face mutually. It is fixing equipment which carries out melting fixing of the toner picture formed on record material while carrying out pinching conveyance of the record material in the pressure-welding section of a fixing roller and a pressurization roller. It has an exiting coil for making the conductive layer prepared in the fixing roller, and its conductive layer produce the induced current, and making them generate heat. An exiting coil makes what wound the coil wire rod around the Kakumaru square configuration superficially by using a rectangular parallelepiped as the heart meet the inside configuration of a fixing roller, and make it deform, and approach a fixing roller inside and appearance arrangement has been carried out. Fixing equipment characterized by arranging the magnetic-substance core so that an opposite side may be met at the curved surface of an exiting coil with the fixing roller side of the longitudinal direction both ends of this exiting coil inside a fixing roller.

[Claim 6] It is image formation equipment characterized by a fixing means being fixing equipment given in any [a claim 2 or] of 5 they are in the image formation equipment which has an imaging means to form a toner picture in record material, and a fixing means to carry out melting fixing of the toner picture formed on record material.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to an exiting coil, fixing equipment, and image formation equipment.

[0002]

[Description of the Prior Art] Conventionally, in image formation equipments, such as a copying machine and a printer, the equipment of a heat mechanical control by roller is used widely as fixing equipment which carries out melting fixing of the toner picture (image of the **** agent (toner) of heating melting nature which consists of a resin, the magnetic substance, a colorant, etc.) which is not established [which carried out formation support on record material by the imprint method or the direct method by proper imaging process meanses, such as an electrophotography process and an electrostatic recording process,] at record material.

[0003] The fixing equipment of a heat mechanical control by roller is what carries out melting fixing of the non-established toner picture by applying heat and a pressure, carrying out **** conveyance of the record material which made the non-established toner picture support with the pressure-welding nip section (fixing nip section) of a pressure welding, a revolving fixing roller (heat roller), and a pressurization roller mutually. What is made to build a halogen lamp in a fixing roller as a heat source, heats a fixing roller from the interior with this halogen lamp as a means to heat the fixing roller which is a heat roller, and carries out the ** tone of the temperature of a fixing roller front face to the suitable temperature for fixing was common.

[0004] As other meanses to heat the fixing roller which is a heat roller, make the conductive layer prepared in the fixing roller inside by the magnetic flux (magnetic field) by the exiting coil generate an eddy current, a conductive layer is made to generate heat by the Joule's heat, and the fixing equipment of the electromagnetic-induction heating method which heated the fixing roller by the generation of heat is proposed.

[0005] The fixing equipment of this electromagnetic-induction heating method has the feature that the time taken for the temperature of a fixing roller front face to turn into suitable temperature for fixing at equipment during starting as compared with the fixing equipment of a toner image using the halogen lamp since it put on near very much can shorten the source of heat release. Moreover, since the heat transfer path from the source of heat release to a toner picture is short and simple, there is the feature that thermal efficiency is high.

[0006]

[Problem(s) to be Solved by the Invention] However, make the conductive layer prepared in the fixing roller inside by the magnetic flux by exiting coil like the above-mentioned conventional example generate an eddy current, and a conductive layer is made to generate heat by the Joule's heat. In the fixing equipment of the electromagnetic-induction heating method which heated the fixing roller by the generation of heat In order to make a conductive layer generate heat efficiently, the exiting coil was made to meet a fixing roller inside, it had to arrange, and the configuration of an exiting coil did not obtain an oak colander intricately, but there was a fault that the mass-production nature of an exiting coil will become bad, and will become high cost.

[0007] Moreover, it is difficult to compensate the recess of the heat from the longitudinal direction both ends of a fixing roller with composition called one exiting coil, and to equalize the skin temperature of a fixing roller longitudinal direction, for example, to a fixing roller skin temperature being the fixing target temperature T_c in the longitudinal direction center section, as shown in the dashed line graph B of drawing 5, 45-degree-C temperature will fall to the fixing target temperature T_c , and, at both ends, it will become uneven temperature distribution. The fault that it is required and the composition of dividing an exiting coil into a longitudinal direction at plurality in order it equalizes a fixing roller skin temperature over a longitudinal direction, and controlling respectively and independent becomes complicated [fixing equipment] and **** is.

[0008] Then, this invention approaches a heated object, is arranged and aims at making a heated object generate heat efficiently and equalizing heated body surface temperature over a longitudinal direction, and raising mass-production nature by simple composition moreover, and enabling low-cost-ization etc. about the exiting coil which makes a heated object produce the induced current and makes it generate heat. Moreover, it aims at enabling highly-efficient-izing of the image formation equipment equipped with the fixing equipment and this fixing equipment of an electromagnetic-induction heating method by this, low-cost-ization, etc.

[0009]

[Means for Solving the Problem] This inventions are the exiting coil and fixing equipment which are characterized by the following composition, and image formation equipment.

[0010] (1) The exiting coil which is an exiting coil which makes a heated object produce the induced current and makes it generate heat, what rolled the coil wire rod superficially is made to meet the curved-surface configuration of a heated object, is made to approach a heated object, to be arranged and to have deformed, and is characterized by arranging the magnetic-substance core so that an opposite side may be met at the curved surface of an exiting coil with the heated object side of the longitudinal direction both ends of this exiting coil.

[0011] (2) It has a heated object and the exiting coil which makes a heated object produce the induced current and makes it generate heat. It is fixing equipment which carries out melting fixing of the toner picture formed on record material of electromagnetic-induction generation of heat of a heated object. An exiting coil is fixing equipment which what rolled the coil wire rod superficially is made to meet the curved-surface configuration of a heated object, and is made to deform, approaches a heated object, is arranged, and is characterized by arranging the magnetic-substance core so that the heated object side of the longitudinal direction both ends of this exiting coil may meet an opposite side at the curved surface of an exiting coil.

[0012] (3) It is fixing equipment given in (2) characterized by for a heated object being body of revolution in the air, and for an exiting coil approaching a hollow inside and arranging it within this body of revolution.

[0013] (4) An exiting coil is fixing equipment given in (2) characterized by making what wound the coil wire rod around the Kakumaru square configuration superficially by using a rectangular parallelepiped as the heart meet the curved-surface configuration of a heated object, making it come to deform, approaching a heated object, and being arranged, or (3).

[0014] (5) It has the fixing roller and pressurization roller which the pressure welding is carried out and can rotate freely on a front face mutually. It is fixing equipment which carries out melting fixing of the toner picture formed on record material while carrying out pinching conveyance of the record material in the pressure-welding section of a fixing roller and a pressurization roller. It has an exiting coil for making the conductive layer prepared in the fixing roller, and its conductive layer produce the induced current, and making them generate heat. An exiting coil makes what wound the coil wire rod around the Kakumaru square configuration superficially by using a rectangular parallelepiped as the heart meet the inside configuration of a fixing roller, and make it deform, and approach a fixing roller inside and appearance arrangement has been carried out. Fixing equipment characterized by arranging the magnetic-substance core so that an opposite side may be met at the curved surface of an exiting coil with the fixing roller side of the longitudinal direction both ends of this exiting coil inside a fixing roller.

[0015] (6) It is image formation equipment characterized by a fixing means being fixing equipment given in any of (2) or (5) they are in the image formation equipment which has an imaging means to form a toner picture in record material, and a fixing means to carry out melting fixing of the toner picture formed on record material.

[0016] <***> It is an exiting coil's making what rolled the coil wire rod superficially meet the curved-surface configuration of a heated object, making it deform in the above-mentioned composition, constituting, approaching a heated object and arranging this. It can act so that the area which faces the heated object of an exiting coil may be large and the distance of an exiting coil and a heated object may become homogeneity over the whole exiting coil, and a heated object can be made to generate heat efficiently. And the configuration of an exiting coil is easy, a process is simplified, mass-production nature can be raised and low-cost-ization is attained.

[0017] And at the longitudinal direction both ends of an exiting coil, in these exiting-coil longitudinal direction both ends, the recess of the heat from the longitudinal direction both ends of a heated object can be compensated with acting so that the magnetic-substance core arranged so that an opposite side might be met at the curved surface of an exiting coil may make a strong magnetic field by part for the heated soma to which this magnetic-substance core corresponds, the temperature gradient in the longitudinal direction center section and both ends of a heated object can be made small, and the skin temperature of the longitudinal direction of a heated object can be equalized with a

[0018] Moreover, highly-efficient-izing and low-cost-ization etc. can be carried out about the image formation equipment equipped with the fixing equipment and this fixing equipment of an electromagnetic-induction heating method by this.

[0019]

[Embodiments of the Invention] <The first example> (drawing 1 - drawing 5)

Drawing 1 is the cross-section model view of the important section of the fixing equipment in this example.

[0020] the fixing roller of the electromagnetic-induction febrility [1] as a heated object, and 2 -- a pressurization roller and 3 -- the exiting-coil-magnetic-substance core unit as a magnetic-flux generating means, and 4 -- for a control circuit and 7, a record material conveyance guide and 8 are [a RF converter (excitation circuit) and 5 / a thermo sensor and 6 / record material (form) and t of a separation presser foot stitch tongue and P] the non-established toner images on this record material

[0021] Arrange the fixing roller 1 and the pressurization roller 2 in parallel up and down, make the bearing material whose ends side is not illustrated have supported them free [rotation], respectively, they energize the pressurization roller 2 in the direction of the axis of rotation of the fixing roller 1 according to the pressurization mechanism in which it does not illustrate [which used the spring etc.], it is made they to carry out a pressure welding to the inferior-surface-of-tongue section of the fixing roller 1 with predetermined welding pressure, and they are making the pressure-welding nip section (fixing nip section) N The rotation drive of the fixing roller 1 is carried out with a predetermined peripheral velocity by the non-illustrated drive at the clockwise rotation of an arrow. The pressurization roller 2 is followed and rotated to rotation of the fixing roller 1 with pressure-welding frictional force with the fixing roller 1 in the pressure-welding nip section N.

[0022] a) The fixing roller 1 of electromagnetic-induction febrility as a fixing roller 1 heated object makes a subject the iron rodding cylinder 11 with an outer diameter [of 32mm], and a thickness of 0.5mm in this example. Permeability μ is comparatively high and the rodding cylinder 11 of electromagnetic-induction febrility may use an object [say / a magnetic material (magnetic metal) like for example, magnetic stainless steel as the other materials] with the suitable resistivity ρ .

[0023] In order to raise the mold-release characteristic of a fixing roller front face to the peripheral face of the rodding cylinder 11, you may form the mold release layer 12 with a thickness [of fluorine system resins, such as PTFE and PFA,] of 10-50 micrometers.

[0024] Moreover, in order to raise the desired stratum functionale, for example, the adhesion of record material and a fixing roller front face, between the rodding cylinder 11 and the mold release layer 12, you may prepare the elastic layer of the 100 micrometers of the thickness number of the rubber material which has thermal resistance and elasticity, or resin material etc.

[0025] b) The pressurization roller 2 pressurization roller 2 forms the layer 22 of Si rubber with a thickness of 5mm in the periphery of the iron rodding 21 with an outer diameter of 20mm. Forming the mold release layer 23 with a thickness [of fluorine system resins, such as PTFE and PFA,] of 10-50 micrometers, in order to raise a surface mold-release characteristic still like the fixing roller 1, the total outer diameter is about 30mm roller.

[0026] The pressurization roller 2 is pressurized by about 30kg pile to the fixing roller 1, and the nip width of face of the pressure-welding nip section N is set to about 4mm in that case. A load may be changed depending on convenience and nip width of face may be changed.

[0027] c) exiting-coil-magnetic-substance core unit 3 drawing 2 -- a part of exiting-coil-magnetic-substance core unit -- a decomposition perspective diagram and drawing 4 of the appearance perspective diagram of a notch and drawing 3 are the production point views of an exiting coil

[0028] **. The exiting-coil-magnetic-substance core unit 3 as a magnetic-flux generating means consists of an exiting coil 31, the magnetic-substance core 32-33-34, a maintenance electrode holder 35 made from aluminum, and insulating thermal-contraction nature tube housing 36 grade, and is inserted and arranged in the fixing roller 1.

[0029] An exiting coil 31 is produced in the following way. That is, as shown in (b) of drawing 4 , a coil wire rod is superficially twisted around the area around which uses the arbor material 100 of the oblong rectangular parallelepiped configuration for coil wire rod contamination of drawing 4 as shown in (a) as the heart, and meets the longitudinal direction spirally, it is made the plate-like swirl type exiting coil 31 of an oblong Kakumaru square configuration, and after performing and fabricating press working of sheet metal etc., the arbor material 100 is removed. (c) of drawing 4 is the plate-like swirl [in the state where the arbor material 100 was removed] type exiting coil 31, and has the linear dimension which carried out abbreviation correspondence in the longitudinal direction size of the fixing roller 1. 31a and 31b are the electric terminals for electric supply prepared in the end section and the other end of a coil wire rod of an exiting coil 31. 31c is the oblong arbor material omission pore for a center of an exiting coil 31.

[0030] What made lead wire with an outer diameter of 0.15-0.50mm which carried out pre-insulation 20-150 Ritz is used for the coil wire rod of an exiting coil 31. By this example, litz wire with the outer diameter of 0.2mm, a 84, and an outer diameter [total] of 3mm is more concretely used as a coil wire rod. The case where an exiting coil 31 carried out a temperature up was considered, and the heat-resistant object was used for pre-insulation.

[0031] Although it became it is good to enlarge the current amplitude of the alternating current impressed to an exiting coil 31, and possible to reduce the number of turns of the coil wire rod of an exiting coil 31 in order to make electromagnetic-induction generation of heat of the fixing roller 1 increase, since generation of heat by the electric resistance of an exiting coil 31 also increased simultaneously, by this example, the number of turns of the coil wire rod of an exiting coil 31 was made into eight rolls.

[0032] **. In the magnetic-substance core 32-33-34, the magnetic-substance core 32 is a center-section magnetic-substance core, and corresponds to the longitudinal direction center section of the exiting coil 31. The magnetic-substance core 33-34 is an edge magnetic-substance core, and corresponds to the longitudinal direction both ends of an exiting coil 31. As for the magnetic-substance core 32-33-34, it is good to use the thing of high permeability and low loss, and it is used for magnetic shielding in order to gather the efficiency of a magnetic circuit.

[0033] The center-section magnetic-substance core 32 is the solid oblong member of the shape of a cross-section abbreviation semicircle to which the longitudinal direction length of the arbor material 100 of a rectangular parallelepiped configuration, abbreviation, etc. which twisted the coil wire rod spread and carried out longitudinal direction length by drawing 4, and a semicircle arc surface processes the configuration where the fixing roller inflexion side was met. 32a is the oblong height which the abbreviation center section of the circumferential direction of the semicircle arc surface section of this center-section magnetic-substance core 32 was made to possess along with magnetic-substance core straight side. the oblong rectangular parallelepiped configuration arbor material 100 for the coil wire rod contamination of the exiting coil 31 which this oblong height 32a described above, and abbreviation -- it has considered as the same configuration 32b is the oblong concave section which the crosswise abbreviation center section of the tooth-back flat-surface section of the magnetic-substance core 32 was made to possess along with straight side. The edge magnetic-substance core 33-34 is the arch type member which processed the semicircle arc surface configuration where the fixing roller inflexion side was met, respectively, can be located in a line in the form where the center-section magnetic-substance core 32 was extended, and is arranged in the longitudinal direction both-ends side of the center-section magnetic-substance core 32.

[0034] **. The maintenance electrode holder 35 made from aluminum is oblong plate-like part material which has linear dimension longer than the longitudinal direction size of the fixing roller 1, has the width-of-face size which carried out abbreviation correspondence in the width-of-face size of the tooth-back flat-surface section of the center-section magnetic-substance core 32, is comparatively thick and has rigidity.

[0035] 35a is the oblong height which the crosswise abbreviation center section by the side of the inside of the maintenance electrode holder 35 was made to possess along with straight side, and has the relation which carries out correspondence fitting with oblong concave section 32b of the tooth-back flat-surface section of the center-section magnetic-substance core 32.

[0036] **. And make oblong arbor material omission pore 31c of the core correspond to oblong height 32a of the semicircle arc surface section of the center-section magnetic-substance core 32, carry out fitting engagement, and the plate-like swirl type exiting coil 31 is made to coalesce to the semicircle arc surface section of the center-section magnetic-substance core 32, as shown in the decomposition perspective diagram of drawing 3. Oblong concave section 32b of the tooth-back flat-surface section of the center-section magnetic-substance core 32 is made to carry out fitting engagement of the oblong height 35a by the side of the inside, and the maintenance electrode holder 35 is made to coalesce to the tooth-back flat-surface section of the center-section magnetic-substance core 32.

[0037] Moreover, it can stand in a line in the form where the center-section magnetic-substance core 32 was extended, and the edge magnetic-substance core 33-34 is arranged in the longitudinal direction both-ends side of the center-section magnetic-substance core 32, respectively. At this time, the edge of the coil wire rod by the side of the cut water of an exiting coil 31 is drawn on the outside of the edge magnetic-substance core 33 through the inside space of the shape of voussure of the edge magnetic-substance core 33 by the side of it. The edge magnetic-substance core 33-34 carries out a correspondence position at the portion protruded from the longitudinal direction both ends of the center-section magnetic-substance core 32 at the longitudinal direction both ends of an exiting coil 31.

[0038] The insulating thermal-contraction nature tube 36 is put on the outside of the attachment object of the above-mentioned exiting coil 31, the magnetic-substance core 32-33-34, and the maintenance electrode holder 35, and it is made to fully carry out the thermal contraction of this tube. By this example, it was the thing of for example, a silicon resin system or a fluororesin system, and the insulating thermal-contraction nature tube 36 was 0.3mm in the outer diameter of 40mm and thickness in front of a thermal contraction, and when carrying out a thermal contraction to the outer diameter of 30mm, it used the thermal-contraction nature tube with which thickness is set to 0.4mm.

[0039] The center section of the plate-like swirl type exiting coil 31 is fabricated by fully carrying out the thermal contraction of the thermal-contraction nature tube 36 along with this semicircle arc surface section corresponding to the semicircle arc surface section of the center-section magnetic-substance core 32, and the longitudinal direction both

ends of an exiting coil 31 are fabricated along with this semicircle arc surface section corresponding to the semicircle arc surface section of the edge exiting coil 33-34, respectively. That is, it is fabricated by the configuration where the fixing roller inflexion side was met. Moreover, an exiting coil 31, the magnetic-substance core 32-33-34, and the maintenance electrode holder 35 are fixed by one, and the exiting-coil-magnetic-substance core unit 3 is constituted. drawing 2 -- a part of this exiting-coil-magnetic-substance core unit 3 -- it is the appearance perspective diagram of a notch

[0040] By being covered by the thermal-contraction nature tube 36 of insulation [opposed face / with the fixing roller inflexion side of an exiting coil 31] especially of the exiting-coil-magnetic-substance core unit 3, the duty to which this tube 36 carries out electric insulation of an exiting coil 31 and the fixing roller inflexion side is also achieved, and electric safety improves.

[0041] A solid magnetic-substance core is sufficient as the edge magnetic-substance core 34 of the side which does not let the edge of the coil wire rod of an exiting coil 31 pass inside.

[0042] **. The above-mentioned exiting-coil-magnetic-substance core unit 3 is inserted into the hollow of the fixing roller 1, a unit 3 is adjusted to the position and the angle posture in which the 31st page portion of an exiting coil currently fabricated by the configuration where the fixing roller inflexion side was met was made to approach a fixing roller inflexion side, the screw stop of the both ends of the maintenance electrode holder 35 of this unit 3 is carried out to the immobility supporter which is not illustrated by the side of the main part of equipment, and fixed support is carried out. the both ends of the maintenance electrode holder 35 were made to possess 35b -- stopping -- screw insertion -- it is a hole

[0043] At this example, on the cross section of the fixing roller 1, the exiting-coil-magnetic-substance core unit 3 is arranged with the angle posture in which it was made to incline like drawing 1 so that the center section (oblong height 32a of the semicircle arc surface section of the center-section magnetic-substance core 32) of the exiting coil 31 may be shifted and located in the hand-of-cut upstream of the fixing roller 1 from the pressure-welding nip section N of the fixing roller 1 and the pressurization roller 2. Since the conductive layer of the fixing roller 1 with which the exiting coil 31 has countered generates heat locally, this is for supplying the toner picture t and the record material P in the pressure-welding nip section N efficiently by making it the exoergic section become just before the pressure-welding nip section N.

[0044] d) Heating of the fixing roller 1 and the ** tone control exiting coil 31 are connected to the RF converter 4, the alternating current of 10-100 [kHz] is impressed, and the RF power to 2000 [W] grades is supplied. The magnetic field guided by the alternating current which flows to an exiting coil 31 passes an eddy current near the inside of the rodding cylinder 11 of the fixing roller 1 which is conductivity, and makes the rodding cylinder 11 generate joule generation of heat (electromagnetic-induction generation of heat). The fixing roller 1 will be in a heating state by electromagnetic-induction generation of heat of this rodding cylinder 11.

[0045] A thermo sensor 5 is a thermistor, it is arranged so that the front face of a portion on which the fixing roller 1 generates heat locally may be contacted, and the fixing roller skin-temperature detecting signal of this thermo sensor 5 inputs it into a control circuit 6. A control circuit 6 is controlling the RF converter 4 based on the fixing roller skin-temperature detecting signal inputted from a thermo sensor 5, and making the electric power supply from the RF converter 4 to an exiting coil 31 fluctuate, the skin temperature of the fixing roller 1 turns into a predetermined constant temperature, and appearance automatic control of it is carried out.

[0046] e) A rotation drive is carried out and the fixing operation fixing roller 1 carries out follower rotation also of the pressurization roller 2 in connection with this. In the state where the rodding cylinder 11 of the fixing roller 1 carries out electromagnetic-induction generation of heat by operation of the generating magnetic flux of the exiting-coil-magnetic-substance core unit 3 as a magnetic-flux generating means, and the skin temperature of the fixing roller 1 turns into a predetermined constant temperature and where appearance automatic control was carried out The record material P which carried out formation support of the non-established toner picture t conveyed from the non-illustrated imaging mechanism section is guided and introduced into the pressure-welding nip section N of the fixing roller 1 and the pressurization roller 2 in the conveyance guide 7. In this case, the non-established toner image formation support side side of the record material P meets the fixing roller 1.

[0047] Pinching conveyance of the record material P introduced into the pressure-welding nip section N of the fixing roller 1 and the pressurization roller 2 is carried out in the pressure-welding nip section N, it is heated with the fixing roller 1 and melting fixing of the non-established toner picture t is carried out at the record material P.

[0048] It dissociates from the fixing roller 1 and eccrisis conveyance of the record material P which passed along the pressure-welding nip section N is carried out. The separation presser foot stitch tongue 8 is for carrying out by making it dissociate from the 1st page of a fixing roller compulsorily, and preventing a jam, when the front face of the fixing roller 1 is made to contact, it has been arranged and the record material P has stuck to the 1st page of a fixing roller

after pressure-welding nip section passage.

[0049] By ***(ing)**, using and remolding heat-shrinkable tubing 35 by this example to the field of the magnetic-substance core 32-33-34 processed into the configuration where the inflexion side of the fixing roller 1 was met beforehand, in the exiting coil 31 once fabricated in the flat-surface configuration, and considering as the exiting-coil-magnetic-substance core unit 3 The area which faces the fixing roller conductive layer (rodding cylinder 11) of an exiting coil 31 is large. It can act so that the distance of an exiting coil 31 and the fixing roller conductive layer 11 may become homogeneity over the whole exiting coil, and a heated object can be made to generate heat efficiently, and the configuration of an exiting coil 31 is easy, a process is simplified, mass-production nature can be raised and low-cost-ization is attained.

[0050] And at the longitudinal direction both ends of an exiting coil 31, it sets to these exiting-coil longitudinal direction both ends. The edge magnetic-substance core 33-34 arranged so that an opposite side might be met with the fixing roller 1 side at the curved surface of an exiting coil 31 by the fixing roller portion to which this magnetic-substance core is equivalent The recess of the heat from the longitudinal direction both ends of the fixing roller 1 can be compensated with acting so that a strong magnetic field may be made, the temperature gradient in the longitudinal direction center section and both ends of the fixing roller 1 can be made small, and the skin temperature of the longitudinal direction of the fixing roller 1 can be equalized.

[0051] Namely, an efficient magnetic circuit can be made with the edge magnetic-substance core 33-34. The flux density which pierces through the conductive layer (rodding cylinder 11) of the fixing roller end section portion corresponding to this edge magnetic-substance core 33-34 becomes large, and the calorific value in the conductive layer of a fixing roller end section portion increases. the recess of the heat from fixing roller both ends -- being suppliable -- a result -- the fixing roller 1 -- the temperature gradient in a longitudinal direction center section and both ends can be made small, and the skin temperature of the longitudinal direction of the fixing roller 1 can be equalized

[0052] Concretely, when there is no edge magnetic-substance core 33-34, the skin-temperature distribution of a fixing roller longitudinal direction is uneven like the dashed line graph B of drawing 5 , and the temperature gradient in a center section and both ends can be equalized within 10 degrees C like real line-chart A by arranging the edge magnetic-substance core 33-34 for what had a 45-degree C temperature gradient at a center section and both ends.

[0053] Moreover, highly-efficient-izing and low-cost-ization etc. can be carried out about the image formation equipment equipped with the fixing equipment and this fixing equipment of an electromagnetic-induction heating method by this.

[0054] <The second example> (drawing 6)

In this example, it arranged and constituted so that the center-section magnetic-substance core 32 of the exiting-coil-magnetic-substance core unit 3 of the first example of the above might be used combining the magnetic-substance core of the rectangular parallelepiped configuration of two or more sheets as shown in the decomposition perspective diagram of the exiting-coil-magnetic-substance core unit 3 of drawing 6 , and the cross section might become T characters. In this example, a total of nine magnetic-substance cores of a rectangular parallelepiped configuration is used, and trichotomy and straight side have trichotomized in the T character type cross section.

[0055] Moreover, an exiting coil 31 is the thing of a three-dimensional configuration which performed press working of sheet metal etc. beforehand so that the inside configuration of the fixing roller 1 might be met in the plate-like swirl type exiting coil created in the way of drawing 4 .

[0056] About the composition member of the other exiting-coil-magnetic-substance core units 3, and the assembly point, it is the same as that of the exiting-coil-magnetic-substance core unit 3 of the first example.

[0057] It has the operation effect as the thing of the first example that the exiting-coil-magnetic-substance core unit 3 and fixing equipment of this example are also the same.

[0058] Moreover, with arranging and constituting from this example so that the center-section magnetic-substance core 32 may be used combining the magnetic-substance core of the rectangular parallelepiped configuration of two or more sheets and a cross section may become T characters, the distribution of the longitudinal direction of a fixing roller skin temperature keeps uniform together with the edge magnetic-substance core 33-34, it can be possible to use a magnetic-substance core with an easy cheap configuration, and the cost of fixing equipment can be lowered.

[0059] <The third example> (drawing 7)

Drawing 7 is the outline block diagram of an example of image formation equipment which made the induction heating apparatus of the above-mentioned example provide as picture heating fixing equipment. The image formation equipment of this example is the laser beam printer of imprint formula electrophotography process use.

[0060] 41 is an electrophotography photo conductor (it is hereafter described as a photo conductor drum) rotating-drum type [as an image support], and a rotation drive is carried out with a predetermined peripheral velocity (process speed) at the clockwise rotation of an arrow.

[0061] The photo conductor drum 41 is first charged uniformly in predetermined polarity and potential with the electrification roller 42 as electrification equipment in the rotation process.

[0062] Next, the laser beam scanning exposure L corresponding to the image information pattern to be based on the laser beam study system (laser scanner) 43 as an aligner is received. Thereby, the electrostatic latent image corresponding to the target image information pattern is formed in the 41st page of a photo conductor drum.

[0063] By the developer 44, the toner development of the electrostatic latent image formed in the 41st page of a photo conductor drum is carried out, and it is visualized. As the development method, the jumping developing-negatives method, the 2 component developing-negatives method, etc. are used, and it is used in many cases in the combination of image exposure and reversal development.

[0064] The toner picture formed in the 41st page of a photo conductor drum is imprinted one by one to the record material (imprint material) P with which this imprint nip section 46 was fed from the feed section 47 to predetermined control timing in the imprint nip section 46 formed with the photo conductor drum 41 and the imprint roller 45. The toner picture on the photo conductor drum 41 is imprinted one by one on the record material P by polar voltage contrary to the electrification polarity of a toner being impressed to the imprint roller 45.

[0065] one-sheet separation feed is carried out by the feed roller 48 and the non-illustrated one-sheet separation member in the record material P which the feed section 47 is [material] the cassette feeding section in the image formation equipment of this example, and carried out loading receipt into the feed cassette -- having -- a conveyance roller pair -- the imprint nip section 46 is fed to predetermined control timing through the sheet path 51 containing 49 and the top sensor 50

[0066] A nose of cam is recognized by the top sensor 50 which formed the record material P with which the imprint nip section 46 is fed through the sheet path 51 from the cassette feeding section 47 in the middle of the sheet path 51, and a picture is formed on the photo conductor drum 41 synchronizing with this.

[0067] It dissociates from the 41st page of a photo conductor drum one by one, and the record material P which received the imprint of a toner picture in the imprint nip section 46 is conveyed through a guide 53 to fixing equipment 54, and receives heating fixing processing of a toner picture with this fixing equipment. Fixing equipment 54 is the induction heating apparatus of the above-mentioned example.

[0068] the record material [finishing / picture fixing] P which came out of fixing equipment 54 -- a conveyance roller pair -- the sheet path 56 containing 55 -- passing -- an eccrisis roller pair -- it is discharged by the delivery tray section 58 by 57

[0069] On the other hand, pollution affixes which remain on the photo conductor drum 41 after the toner picture imprint to the record material P (after paper separation), such as an imprint remains toner and paper powder, are removed from photo conductor drum 41 front face by the cleaner 52, and imaging is repeatedly presented with the photo conductor drum 41 by which surface cleaning was carried out.

[0070] The formation principle and the process of ***** [as opposed to record material about image formation equipment] are arbitrary.

[0071] Image heating apparatus, such as heating support **** record material, reforming front-face nature, such as gloss, or carrying out assumption arrival of the picture, is also contained in the fixing equipment of this invention.

[0072]
[Effect of the Invention] As explained above, this invention approaches a heated object, is arranged, about the exiting coil which makes a heated object produce the induced current and makes it generate heat, raises mass-production nature by making a heated object generate heat efficiently and equalizing heated body surface temperature over a longitudinal direction, and composition simple moreover, and enables low-cost-ization etc. Moreover, highly-efficient-izing of the image formation equipment equipped with the fixing equipment and this fixing equipment of an electromagnetic-induction heating method by this, low-cost-ization, etc. are enabled.

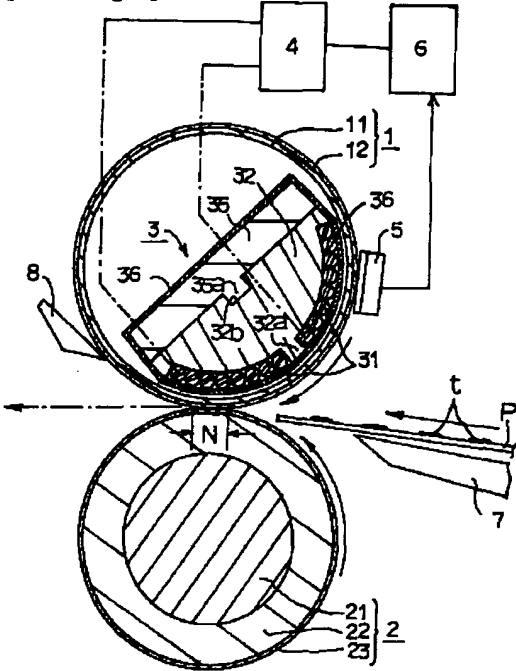
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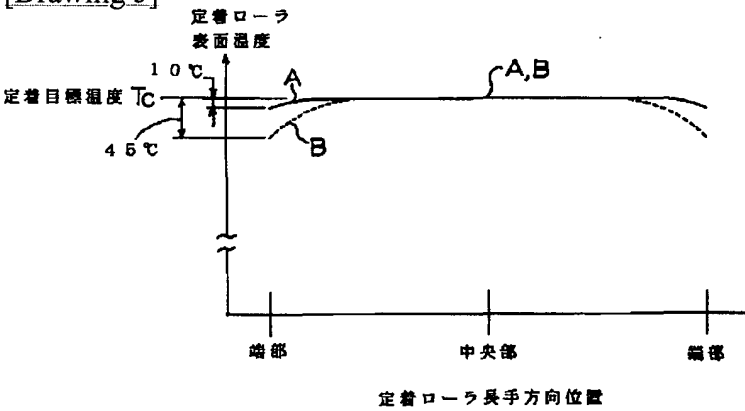
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DRAWINGS

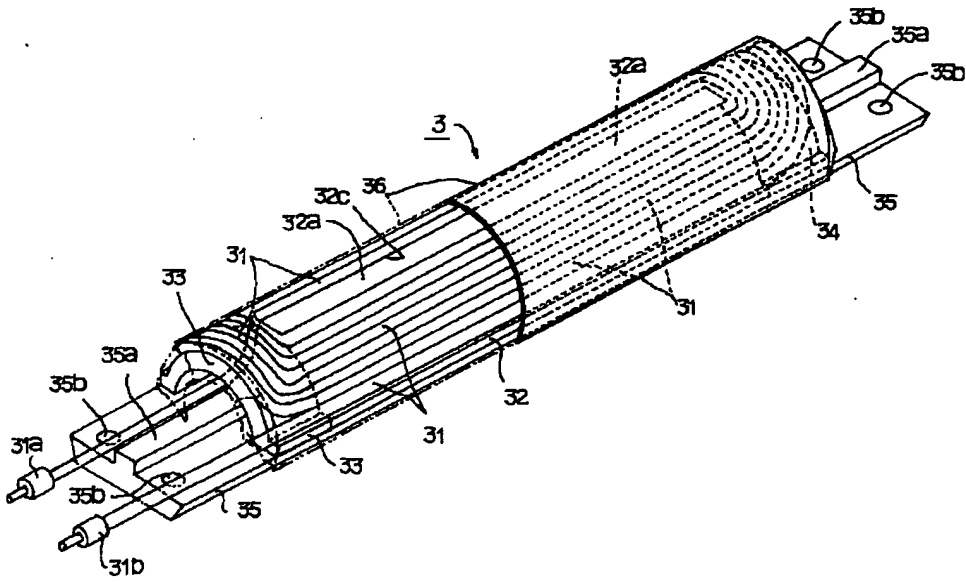
[Drawing 1]



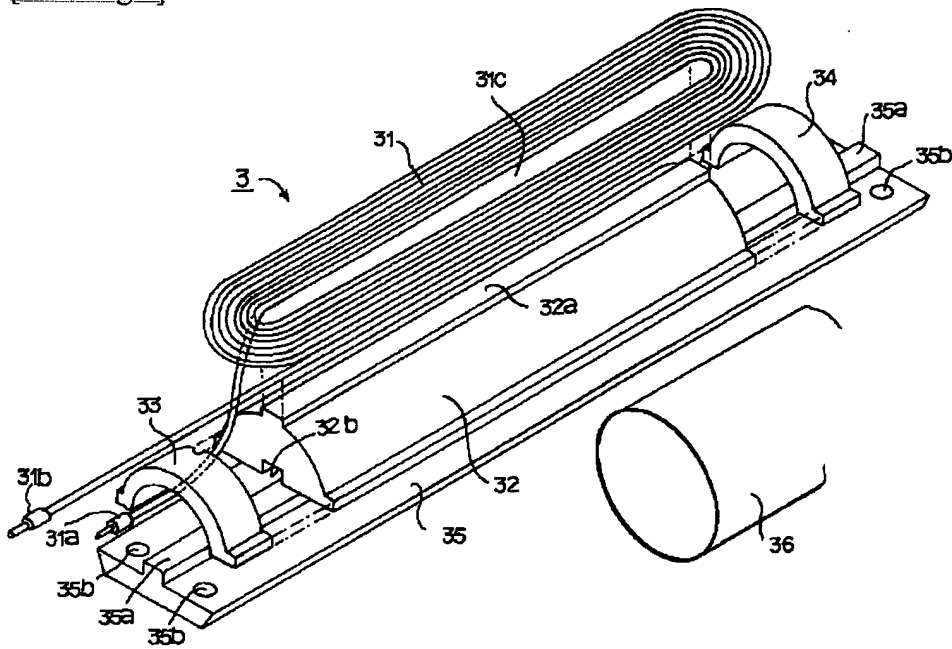
[Drawing 5]



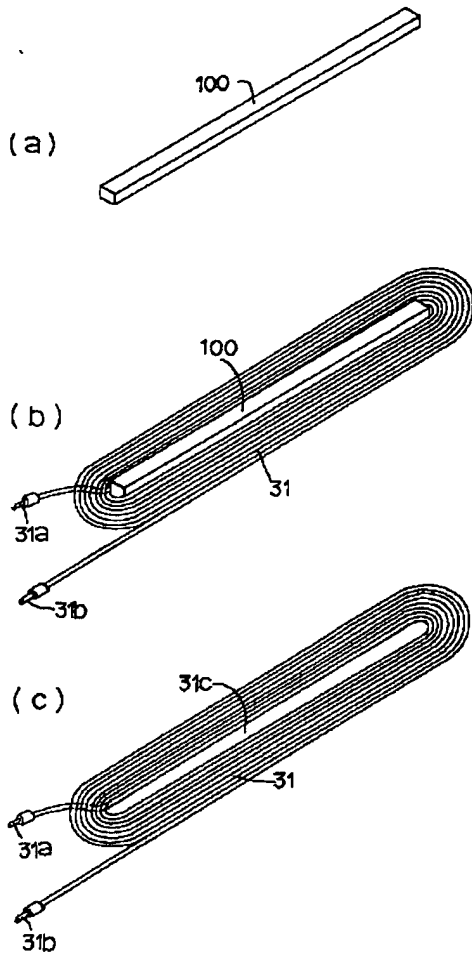
[Drawing 2]



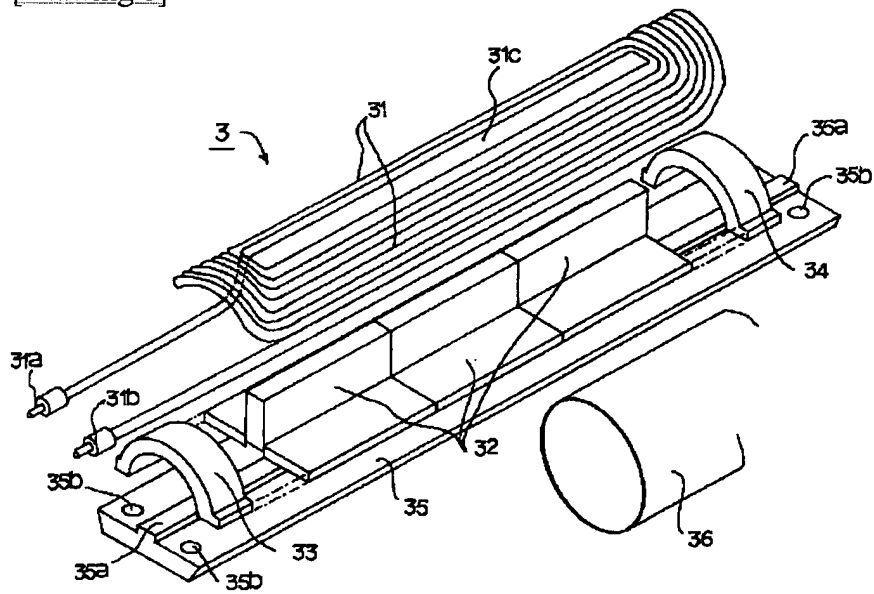
[Drawing 3]



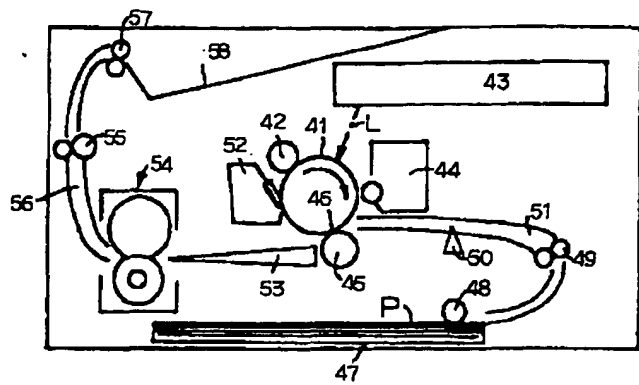
[Drawing 4]



[Drawing 6]



[Drawing 7]



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[0071] The record material which supported the picture is heated, front-face nature, such as gloss, is reformed or image heating apparatus, such as carrying out assumption arrival, is also contained in the fixing equipment of this invention.

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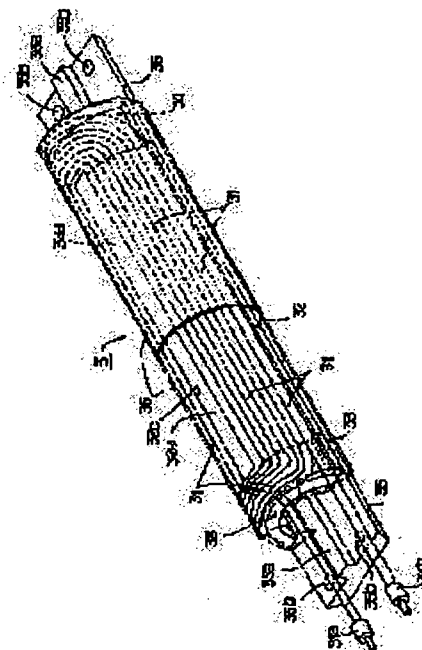
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FUJITA TAKESHI

(54) EXCITING COIL, FIXING DEVICE, AND IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To effectively heat a heated body, to longitudinally equalize surface temperature of the heated body, and to improve mass productivity with a simple structure to reduce a cost, in an exciting coil provided close to the heated body and causing an induction current to the heated body to cause heat to it, and thereby, to improve performance and reduce cost of both an electromagnetic induction heating type fixing device and an image forming device with the fixing device.

SOLUTION: This exciting coil 31 is provide close to a heated body and causes an induction current to the heated body to cause heat to it. A coil wire of the exciting coil 31 is wound flatwise and deformed along a curved surface shape of the heated body, while magnetic cores 33, 34 are provide on the opposite side of the heated body side in both longitudinal end parts of the exciting coil 31 along the curved surface of the exciting coil 31.



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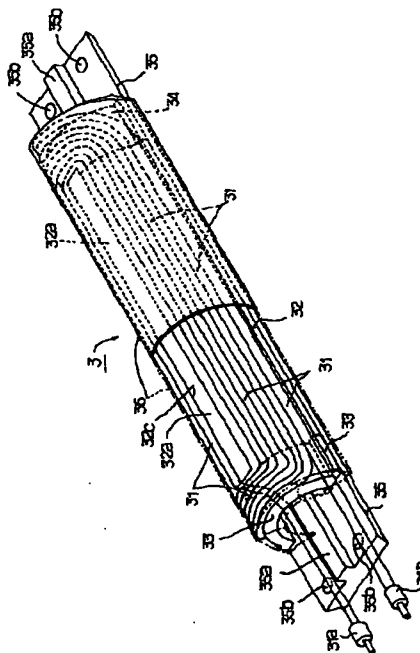
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(54)【発明の名称】 励磁コイル、定着装置、及び画像形成装置

(57)【要約】

【課題】被加熱体に近接して配設され、被加熱体に誘導電流を生じさせて発熱させる励磁コイルについて、被加熱体を効率よく発熱させること、かつ被加熱体表面温度を長手方向に渡って均一化すること、しかも簡素な構成により量産性を向上させて低コスト化等を可能にすること。またこれにより電磁誘導加熱方式の定着装置および該定着装置を備えた画像形成装置の高性能化、低コスト化等を可能にすること。

【解決手段】被加熱体に近接して配設され、被加熱体に誘導電流を生じさせて発熱させる励磁コイル31であり、コイル線材を平面的に巻いたものを被加熱体の曲面形状に沿わせて変形させてあり、該励磁コイル31の長手方向両端部の被加熱体側とは反対側に励磁コイルの曲面に沿う様に磁性体コア33・34が配設されていることを特徴とする励磁コイル。



【特許請求の範囲】

【請求項1】 被加熱体に近接して配設され、被加熱体に誘導電流を生じさせて発熱させる励磁コイルであり、コイル線材を平面的に巻いたものを被加熱体の曲面形状に沿わせて変形させてあり、該励磁コイルの長手方向両端部の被加熱体側とは反対側に励磁コイルの曲面に沿う様に磁性体コアが配設されていることを特徴とする励磁コイル。

【請求項2】 被加熱体と、被加熱体に誘導電流を生じさせて発熱させる励磁コイルとを有し、被加熱体の電磁誘導発熱により記録材上に形成されたトナー画像を溶融定着する定着装置であって、励磁コイルはコイル線材を平面的に巻いたものを被加熱体の曲面形状に沿わせて変形させて被加熱体に近接して配設され、該励磁コイルの長手方向両端部の被加熱体側とは反対側に励磁コイルの曲面に沿う様に磁性体コアが配設されていることを特徴とする定着装置。

【請求項3】 被加熱体が中空の回転体であり、励磁コイルはこの回転体内で中空内面に近接して配設されていることを特徴とする請求項2に記載の定着装置。

【請求項4】 励磁コイルはコイル線材を直方体を芯として角丸四角形状に平面的に巻いたものを被加熱体の曲面形状に沿わせて変形させてなり、被加熱体に近接して配設されていることを特徴とする請求項2又は3に記載の定着装置。

【請求項5】 互いに表面で圧接されていて自由に回転できる定着ローラ及び加圧ローラとを有して、記録材を定着ローラと加圧ローラとの圧接部で挟持搬送しながら記録材上に形成されたトナー画像を溶融定着する定着装置であって、定着ローラに設けられた導電層とその導電層に誘導電流を生じさせて発熱させるための励磁コイルとを有して、励磁コイルはコイル線材を直方体を芯として角丸四角形状に平面的に巻いたものを定着ローラの内面形状に沿わせて変形させ定着ローラ内面に近接する様配設してあり、定着ローラ内部の該励磁コイルの長手方向両端部の定着ローラ側とは反対側に励磁コイルの曲面に沿う様に磁性体コアが配設されていることを特徴とする定着装置。

【請求項6】 記録材にトナー画像を形成する作像手段と、記録材上に形成されたトナー画像を溶融定着させる定着手段を有する画像形成装置において、定着手段は請求項2ないし5の何れかに記載の定着装置であることを特徴とする画像形成装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、励磁コイル、定着装置、及び画像形成装置に関する。

【0002】

【従来の技術】従来、複写機・プリンタ等の画像形成装置において、電子写真プロセス・静電記録プロセス等の

適宜の作像プロセス手段により転写方式あるいは直接方式で記録材上に形成担持させた未定着のトナー画像（樹脂・磁性体・着色料等からなる加熱溶融性の顔画剤（トナー）の像）を記録材に溶融定着する定着装置としては熱ローラ方式の装置が汎用されている。

【0003】熱ローラ方式の定着装置は互いに圧接・回転している定着ローラ（熱ローラ）と加圧ローラとの圧接ニップ部（定着ニップ部）で未定着トナー画像を担持させた記録材を挟持搬送しながら熱と圧力を加えることで未定着トナー画像を溶融定着せしめるもので、熱ローラである定着ローラを加熱する手段として、定着ローラに熱源としてハロゲンランプを内蔵させ、該ハロゲンランプで定着ローラを内部から加熱して、定着ローラ表面の温度を定着に適当な温度に温調するものが一般的であった。

【0004】熱ローラである定着ローラを加熱する他の手段として、励磁コイルによる磁束（磁界）で定着ローラ内面に設けた導電層に渦電流を発生させてジュール熱により導電層を発熱させ、その発熱により定着ローラを加熱するようにした電磁誘導加熱方式の定着装置が提案されている。

【0005】この電磁誘導加熱方式の定着装置は熱発生源をトナー像のごく近くに置くことができるので、ハロゲンランプを用いた定着装置に比して、装置起動時に定着ローラ表面の温度が定着に適当な温度になるまでに要する時間が短くできるという特徴がある。また熱発生源からトナー画像への熱伝達経路が短く単純であるため熱効率が低いという特徴もある。

【0006】

【発明が解決しようとする課題】しかしながら、上記従来例の様な励磁コイルによる磁束で定着ローラ内面に設けた導電層に渦電流を発生させてジュール熱により導電層を発熱させ、その発熱により定着ローラを加熱するようにした電磁誘導加熱方式の定着装置において、効率よく導電層を発熱させるためには励磁コイルを定着ローラ内面に沿わせて配設しなければならず励磁コイルの形状が複雑にならざるを得ず、励磁コイルの量産性が悪くなり高コストになってしまうといった欠点があった。

【0007】また、励磁コイル一つという構成で定着ローラの長手方向両端部からの熱の逃げを補って定着ローラ長手方向の表面温度を均一化する事は難しく、例えば図5の破線グラフBに示す様に定着ローラ表面温度が長手方向中央部では定着目標温度 T_c であるのに対し、両端部では定着目標温度 T_c に対して45℃温度が下がってしまい不均一な温度分布になってしまう。定着ローラ表面温度を長手方向に渡って均一化するためには励磁コイルを長手方向に複数個に分割してそれぞれ独立に制御するなどといった構成が必要で、定着装置が複雑で効果的なものになってしまうといった欠点があった。

【0008】そこで本発明は、被加熱体に近接して配設

され、被加熱体に誘導電流を生じさせて発熱させる励磁コイルについて、被加熱体を効率よく発熱させること、かつ被加熱体表面温度を長手方向に渡って均一化すること、しかも簡素な構成により量産性を向上させて低コスト化等を可能にすることを目的とする。またこれにより電磁誘導加熱方式の定着装置および該定着装置を備えた画像形成装置の高性能化、低コスト化等を可能にすることを目的とする。

【0009】

【課題を解決するための手段】本発明は下記の構成を特徴とする、励磁コイル、定着装置、及び画像形成装置である。

【0010】(1) 被加熱体に近接して配設され、被加熱体に誘導電流を生じさせて発熱させる励磁コイルであり、コイル線材を平面的に巻いたものを被加熱体の曲面形状に沿わせて変形させてあり、該励磁コイルの長手方向両端部の被加熱体側とは反対側に励磁コイルの曲面に沿う様に磁性体コアが配設されていることを特徴とする励磁コイル。

【0011】(2) 被加熱体と、被加熱体に誘導電流を生じさせて発熱させる励磁コイルとを有し、被加熱体の電磁誘導発熱により記録材上に形成されたトナー画像を溶融定着する定着装置であって、励磁コイルはコイル線材を平面的に巻いたものを被加熱体の曲面形状に沿わせて変形させて被加熱体に近接して配設され、該励磁コイルの長手方向両端部の被加熱体側とは反対側に励磁コイルの曲面に沿う様に磁性体コアが配設されていることを特徴とする定着装置。

【0012】(3) 被加熱体が中空の回転体であり、励磁コイルはこの回転体内で中空内面に近接して配設されていることを特徴とする(2)に記載の定着装置。

【0013】(4) 励磁コイルはコイル線材を直方体を芯として角丸四角形状に平面的に巻いたものを被加熱体の曲面形状に沿わせて変形させてなり、被加熱体に近接して配設されていることを特徴とする(2)又は(3)に記載の定着装置。

【0014】(5) 互いに表面で圧接されていて自由に回転できる定着ローラ及び加圧ローラとを有して、記録材を定着ローラと加圧ローラとの圧接部で挟持搬送しながら記録材上に形成されたトナー画像を溶融定着する定着装置であって、定着ローラに設けられた導電層とその導電層に誘導電流を生じさせて発熱させるための励磁コイルとを有して、励磁コイルはコイル線材を直方体を芯として角丸四角形状に平面的に巻いたものを定着ローラの内面形状に沿わせて変形させ定着ローラ内面に近接する様配設してあり、定着ローラ内部の該励磁コイルの長手方向両端部の定着ローラ側とは反対側に励磁コイルの曲面に沿う様に磁性体コアが配設されていることを特徴とする定着装置。

【0015】(6) 記録材にトナー画像を形成する作像

手段と、記録材上に形成されたトナー画像を溶融定着させる定着手段を有する画像形成装置において、定着手段は(2)ないし(5)の何れかに記載の定着装置であることを特徴とする画像形成装置。

【0016】〈作用〉上記構成において、励磁コイルはコイル線材を平面的に巻いたものを被加熱体の曲面形状に沿わせて変形させて構成し、これを被加熱体に近接して配設することで、励磁コイルの被加熱体に面する面積が広く、励磁コイルと被加熱体との距離が励磁コイル全体にわたって均一になるように作用して被加熱体を効率よく発熱させることができ、かつ励磁コイルの形状が簡単で製法が簡素化されて量産性を向上させることができて低コスト化が可能となる。

【0017】そして励磁コイルの長手方向両端部ではこの励磁コイル長手方向両端部において被加熱体側とは反対側に励磁コイルの曲面に沿う様に配設した磁性体コアが該磁性体コアが対応している被加熱体部分により強い磁界を作るように作用することで被加熱体の長手方向両端部からの熱の逃げを補って被加熱体の長手方向中央部と両端部とでの温度差を小さくすることができて、被加熱体の長手方向の表面温度を均一化する事ができる。

【0018】またこれにより電磁誘導加熱方式の定着装置および該定着装置を備えた画像形成装置について高性能化、低コスト化等をすることができる。

【0019】

【発明の実施の形態】〈第一の実施例〉(図1～図5) 図1は本実施例における定着装置の要部の横断面模型図である。

【0020】1は被加熱体としての電磁誘導発熱性の定着ローラ、2は加圧ローラ、3は磁束発生手段としての励磁コイル-磁性体コアユニット、4は高周波コンバーター(励磁回路)、5は温度センサー、6は制御回路、7は記録材搬送ガイド、8は分離爪、Pは記録材(用紙)、tはこの記録材上の未定着トナー像である。

【0021】定着ローラ1と加圧ローラ2は上下に並行に配列してそれぞれ両端側を不図示の軸受部材に回転自在に支持させてあり、加圧ローラ2をバネなどを用いた不図示の加圧機構によって定着ローラ1の回転軸方向に付勢して定着ローラ1の下面部に所定の加圧力で圧接させて圧接ニップ部(定着ニップ部)Nを形成させている。定着ローラ1は不図示の駆動機構により矢印の時計方向に所定の周速度で回転駆動される。加圧ローラ2は圧接ニップ部Nでの定着ローラ1との圧接摩擦力で定着ローラ1の回転に従動して回転する。

【0022】a) 定着ローラ1

被加熱体としての電磁誘導発熱性の定着ローラ1は、本例では、外径32mm、厚さ0.5mmの鉄製の芯金シリンダ11を主体とするものである。電磁誘導発熱性の芯金シリンダ11はその他の材料として例えば磁性ステンレスのような磁性材料(磁性金属)といった、比較的

透磁率 μ が高く、適当な抵抗率 ρ を持つ物を用いてもよい。

【0023】芯金シリンダ11の外周面には定着ローラ表面の離型性を高めるために、例えばPTFEやPFA等のフッ素系樹脂の厚さ10～50 μ mの離型層12を設けてもよい。

【0024】また芯金シリンダ11と離型層12の間に所望の機能層、例えば、記録材と定着ローラ表面との密着性を高めるために耐熱性・弾性を有するゴム材や樹脂材の厚さ数100 μ mの弾性層などを設けてもよい。

【0025】b) 加圧ローラ2

加圧ローラ2は、外径20mmの鉄製の芯金21の外周に、厚さ5mmのSiゴムの層22を設けたものである。さらに定着ローラ1と同様に表面の離型性を高めるために例えばPTFEやPFA等のフッ素系樹脂の厚さ10～50 μ mの離型層23を設けてもよく、総外径は約30mmのローラである。

【0026】加圧ローラ2は定着ローラ1に対して約30Kg重で加圧されており、その場合圧接ニップ部Nのニップ幅は約4mmになる。都合によっては荷重を変化させてニップ幅を変えてもよい。

【0027】c) 励磁コイル-磁性体コアユニット3
図2は励磁コイル-磁性体コアユニットの一部切欠きの外観斜視図、図3は分解斜視図、図4は励磁コイルの作製要領図である。

【0028】①. 磁束発生手段としての励磁コイル-磁性体コアユニット3は、励磁コイル31、磁性体コア32・33・34、アルミニウム製の保持ホルダー35、絶縁性の熱収縮性チューブ外被36等からなり、定着ローラ1内に挿入して配設してある。

【0029】励磁コイル31は次の要領で作製したものである。即ち、図4の(a)のようなコイル線材巻き込み用の横長直方体形状の芯棒材100を芯にしてその長手方向に沿う外回りに図4の(b)のようにコイル線材を平面的にうず巻き状に巻き付けて横長の角丸四角形状の平板状うず巻き型の励磁コイル31にし、プレス加工等を施して成形してから芯棒材100を外す。図4の

(c)は芯棒材100を外した状態の平板状うず巻き型の励磁コイル31であり、定着ローラ1の長手方向寸法に略対応した長さ寸法を有する。31a・31bは励磁コイル31のコイル線材の一端部と他端部に設けた給電用電気端子である。31cは励磁コイル31の中央分の横長の芯棒材抜き孔部である。

【0030】励磁コイル31のコイル線材は、外径0.15～0.50mmの絶縁被覆した導線を20～150本リッツにしたものを用いている。より具体的に本例では、外径0.2mm、84本、総外径3mmのリッツ線をコイル線材として用いている。励磁コイル31が昇温した場合を考えて絶縁被覆には耐熱性の物を使用した。

【0031】定着ローラ1の電磁誘導発熱を増加させる

ためには励磁コイル31に印加する交流電流の電流振幅を大きくすると良く、励磁コイル31のコイル線材の巻き数を減らしてやる事が可能となるが、同時に励磁コイル31の電気抵抗による発熱も増加するので、本実施例では励磁コイル31のコイル線材の巻き数は8巻きとした。

【0032】②. 磁性体コア32・33・34において、磁性体コア32は中央部磁性体コアであり、励磁コイル31の長手方向中央部に対応する。磁性体コア33・34は端部磁性体コアであり、励磁コイル31の長手方向両端部に対応する。磁性体コア32・33・34は高透磁率かつ低損失のものを用いると良く、磁気回路の効率を上げるためと磁気遮蔽のために用いている。

【0033】中央部磁性体コア32は長手方向長さを図4でコイル線材を巻き付けた直方体形状の芯棒材100の長手方向長さと略等しくした、横断面略半円状の中実の横長部材で、半円弧面は定着ローラ内曲面に沿った形状に加工したものである。32aはこの中央部磁性体コア32の半円弧面部の円周方向の略中央部に磁性体コア長手に沿って具備させた横長突起部である。この横長突起部32aは前記した励磁コイル31のコイル線材巻き込み用の横長直方体形状芯棒材100と略同じ形状としてある。32bは磁性体コア32の背面平面部の幅方向略中央部に長手に沿って具備させた横長凹溝部である。

端部磁性体コア33・34はそれぞれ定着ローラ内曲面に沿った半円弧面形状に加工したアーチ型部材であり、中央部磁性体コア32の長手方向両端部側に中央部磁性体コア32を延長した形でならべて配設される。

【0034】③. アルミニウム製の保持ホルダー35は定着ローラ1の長手方向寸法よりも長い長さ寸法を有し、中央部磁性体コア32の背面平面部の幅寸法に略対応した幅寸法を有し、比較的肉厚で剛性の有る横長板状部材である。

【0035】35aは保持ホルダー35の内面側の幅方向略中央部に長手に沿って具備させた横長突起部であり、中央部磁性体コア32の背面平面部の横長凹溝部32bと対応嵌合する関係にある。

【0036】④. そして、図3の分解斜視図に示すように、中央部磁性体コア32の半円弧面部に対して平板状うず巻き型の励磁コイル31をその中心部の横長の芯棒材抜き孔部31cを中央部磁性体コア32の半円弧面部の横長突起部32aに対応させて嵌合係合させて合体させ、中央部磁性体コア32の背面平面部に対して保持ホルダー35をその内面側の横長突起部35aを中央部磁性体コア32の背面平面部の横長凹溝部32bに嵌合係合させて合体させる。

【0037】また、中央部磁性体コア32の長手方向両端部側にそれぞれ端部磁性体コア33・34を中央部磁性体コア32を延長した形でならべて配設する。このとき、励磁コイル31の巻き始め側のコイル線材の端部を

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その側の端部磁性体コア 33 のアーチ形状の内側空間を通して端部磁性体コア 33 の外側に導き出す。端部磁性体コア 33・34 は励磁コイル 31 の長手方向両端部で中央部磁性体コア 32 の長手方向両端部からはみ出した部分に対応位置する。

【0038】上記の励磁コイル 31、磁性体コア 32・33・34、保持ホルダー 35 の組み付け体の外側に絶縁性の熱収縮性チューブ 36 を被せて該チューブを十分に熱収縮させる。絶縁性の熱収縮性チューブ 36 は例えばシリコン樹脂系あるいはフッ素樹脂系のものであり、本例では熱収縮前の外径 40mm・厚さ 0.3mm で、外径 30mm に熱収縮させたとき肉厚が 0.4mm となる熱収縮性チューブを用いた。

【0039】熱収縮性チューブ 36 を十分に熱収縮させることで、平板状うず巻き型の励磁コイル 31 の中央部は中央部磁性体コア 32 の半円弧面部に対応して該半円弧面部に沿って成形され、また励磁コイル 31 の長手方向両端部はそれぞれ端部励磁コイル 33・34 の半円弧面部に対応して該半円弧面部に沿って成形される。即ち定着ローラ内曲面に沿った形状に成形される。また励磁コイル 31、磁性体コア 32・33・34、保持ホルダー 35 が一体に固定化されて励磁コイル-磁性体コアユニット 3 が構成される。図 2 はこの励磁コイル-磁性体コアユニット 3 の一部切欠きの外観斜視図である。

【0040】励磁コイル-磁性体コアユニット 3 の特に励磁コイル 31 の定着ローラ内曲面との対向面が絶縁性の熱収縮性チューブ 36 で覆われることで、該チューブ 36 が励磁コイル 31 と定着ローラ内曲面とを電気絶縁する役目も果たし、電気的安全性が向上する。

【0041】励磁コイル 31 のコイル線材の端部を内側に通さない側の端部磁性体コア 34 は中実の磁性体コアでもよい。

【0042】⑤、上記の励磁コイル-磁性体コアユニット 3 を定着ローラ 1 の中空内に挿入し、定着ローラ内曲面に沿った形状に成形されている励磁コイル 31 面部分を定着ローラ内曲面に近接させた所定の位置・角度姿勢にユニット 3 を調整して該ユニット 3 の保持ホルダー 35 の両端部を装置本体側の不図示の不動支持部にビス止めして固定支持させる。35b は保持ホルダー 35 の両端部に具備させた止めビス挿通孔である。

【0043】本実施例では、定着ローラ 1 の横断面において、励磁コイル 31 の中央部（中央部磁性体コア 32 の半円弧面部の横長突起部 32a）が定着ローラ 1 と加圧ローラ 2 との圧接ニップ部 N よりも定着ローラ 1 の回転方向上流側にずれて位置するように励磁コイル-磁性体コアユニット 3 を図 1 のように傾かせた角度姿勢で配設している。これは励磁コイル 31 が対向している定着ローラ 1 の導電層が局部的に発熱するため、その発熱部が圧接ニップ部 N の直前になるようにすることで効率よく圧接ニップ部 N でトナー画像 t と記録材 P に供給するた

めである。

【0044】d) 定着ローラ 1 の加熱と温調制御
励磁コイル 31 は高周波コンバーター 4 に接続してあり 10~100 [kHz] の交流電流が印加され、2000 [W] 程度までの高周波電力が供給される。励磁コイル 31 に流れる交流電流によって誘導された磁界は導電性である定着ローラ 1 の芯金シリンダ 11 の内面付近に渦電流を流し、芯金シリンダ 11 にジュール発熱を発生させる（電磁誘導発熱）。この芯金シリンダ 11 の電磁誘導発熱で定着ローラ 1 が加熱状態となる。

【0045】温度センサー 5 は例えばサーミスタであり、定着ローラ 1 の局所的に発熱する部分の表面に当接するように配置され、この温度センサー 5 の定着ローラ表面温度検出信号が制御回路 6 に入力する。制御回路 6 は温度センサー 5 から入力する定着ローラ表面温度検出信号をもとに高周波コンバーター 4 を制御して高周波コンバーター 4 から励磁コイル 31 への電力供給を増減させることで、定着ローラ 1 の表面温度が所定の一定温度になる様自動制御される。

【0046】e) 定着動作

定着ローラ 1 が回転駆動され、これに伴い加圧ローラ 2 も従動回転し、磁束発生手段としての励磁コイル-磁性体コアユニット 3 の発生磁束の作用により定着ローラ 1 の芯金シリンダ 11 が電磁誘導発熱して定着ローラ 1 の表面温度が所定の一定温度になる様自動制御された状態において、定着ローラ 1 と加圧ローラ 2 との圧接ニップ部 N に、不図示の作像機構部から搬送された未定着トナー画像 t を形成担持した記録材 P が搬送ガイド 7 で案内されて導入される。この場合、記録材 P の未定着トナー画像形成担持面側が定着ローラ 1 に対面する。

【0047】定着ローラ 1 と加圧ローラ 2 との圧接ニップ部 N に導入された記録材 P は圧接ニップ部 N を挟持搬送され、定着ローラ 1 で加熱されて、未定着トナー画像 t が記録材 P に熔融定着される。

【0048】圧接ニップ部 N を通った記録材 P は定着ローラ 1 から分離して排出搬送されていく。分離爪 8 は定着ローラ 1 の表面に当接させて配置され、記録材 P が圧接ニップ部通過後に定着ローラ 1 面に張り付いてしまった場合に定着ローラ 1 面から強制的に分離させてしてジャムを防止するためのものである。

【0049】而して、本実施例では、一旦平面形状に成形した励磁コイル 31 を予め定着ローラ 1 の内曲面に沿った形状に加工されている磁性体コア 32・33・34 の面に熱収縮チューブ 35 を用いて再成形して励磁コイル-磁性体コアユニット 3 とすることで、励磁コイル 31 の定着ローラ導電層（芯金シリンダ 11）に面する面積が広く、励磁コイル 31 と定着ローラ導電層 11 との距離が励磁コイル全体にわたって均一になるように作用して被加熱体を効率よく発熱させることができ、かつ励磁コイル 31 の形状が簡単で製法が簡素化されて量産性

を向上させることができ低コスト化が可能となる。

【0050】そして励磁コイル31の長手方向両端部ではこの励磁コイル長手方向両端部において定着ローラ1側とは反対側に励磁コイル31の曲面に沿う様に配設した端部磁性体コア33・34が該磁性体コアが対応している定着ローラ部分により強い磁界を作るように作用することで定着ローラ1の長手方向両端部からの熱の逃げを捕って定着ローラ1の長手方向中央部と両端部との温度差を小さくすることができ、定着ローラ1の長手方向の表面温度を均一化する事ができる。

【0051】即ち、端部磁性体コア33・34によって効率の良い磁気回路を作ることができ、該端部磁性体コア33・34に対応する定着ローラ端部部分の導電層（芯金シリンダ11）を貫く磁束密度が大きくなって定着ローラ端部部分の導電層での発熱量が増え、定着ローラ両端部からの熱の逃げを捕うことができ、結果、定着ローラ1の長手方向中央部と両端部との温度差を小さくすることができ、定着ローラ1の長手方向の表面温度を均一化する事ができる。

【0052】具体的に、端部磁性体コア33・34がない場合には定着ローラ長手方向の表面温度分布が図5の破線グラフBの様に不均一で中央部と両端部で45℃の温度差があったものを、端部磁性体コア33・34を配設することで実線グラフAの様に中央部と両端部での温度差を10℃以内に均一化することができる。

【0053】またこれにより電磁誘導加熱方式の定着装置および該定着装置を備えた画像形成装置について高性能化、低コスト化等を行うことができる。

【0054】〈第二の実施例〉（図6）

本実施例においては、上記第一の実施例の励磁コイルー磁性体コアユニット3の中央部磁性体コア32を図6の励磁コイルー磁性体コアユニット3の分解斜視図に示すように複数枚の直方体形状の磁性体コアを組み合わせる用いて横断面がT字となる様に配設して構成した。本実施例においては直方体形状の磁性体コアを合計9個用いており、T字型の断面で3分割、長手で3分割してある。

【0055】また励磁コイル31は図4の要領で作成した平板状うず巻き型の励磁コイルを定着ローラ1の内面形状に沿う様に予めプレス加工などを施した立体的形状のものである。

【0056】その他の励磁コイルー磁性体コアユニット3の構成部材、組み立て要領については第一の実施例の励磁コイルー磁性体コアユニット3と同様である。

【0057】本実施例の励磁コイルー磁性体コアユニット3及び定着装置も第一の実施例のものと同様の作用効果を有する。

【0058】また本実施例では中央部磁性体コア32を複数枚の直方体形状の磁性体コアを組み合わせる用いて断面がT字になる様に配設して構成することで、端部磁

性体コア33・34との協同で定着ローラ表面温度の長手方向の分布は均一のままにして簡単な形状の安価な磁性体コアを用いる事が可能で定着装置のコストを下げることができる。

【0059】〈第三の実施例〉（図7）

図7は上記例の誘導加熱装置を画像加熱定着装置として具備させた画像形成装置の一例の概略構成図である。本例の画像形成装置は転写式電子写真プロセス利用のレーザビームプリンタである。

10 【0060】41は像担持体としての回転ドラム型の電子写真感光体（以下、感光体ドラムと記す）であり、矢印の時計方向に所定の周速度（プロセススピード）をもって回転駆動される。

【0061】感光体ドラム41はその回転過程において、まず、帯電装置としての帯電ローラ42によって所定の極性・電位に様に帯電される。

【0062】次に、露光装置としてのレーザ光学系（レーザスキャナ）43による、目的の画像情報パターンに対応したレーザビーム走査露光を受ける。これにより感光体ドラム41面に目的の画像情報パターンに対応した静電潜像が形成される。

【0063】感光体ドラム41面に形成された静電潜像は現像装置44でトナー現像されて可視化される。現像方法としては、ジャンピング現像法、2成分現像法等が用いられ、イメージ露光と反転現像との組み合わせで用いられることが多い。

【0064】感光体ドラム41面に形成されたトナー画像は、感光体ドラム41と転写ローラ45とで形成される転写ニップ部46において、給紙部47から該転写ニップ部46に所定の制御タイミングにて給送された記録材（転写材）Pに対して順次に転写される。感光体ドラム41上のトナー画像は転写ローラ45にトナーの帯電極性とは逆の極性の電圧が印加されることで記録材P上に順次に転写される。

【0065】本例の画像形成装置において給紙部47はカセット給紙部であり、給紙カセット内に積載収納させた記録材Pが給紙ローラ48と不図示の1枚分離部材とによって1枚分離給送され、搬送ローラ対49、トップセンサー50を含むシートパス51を通して転写ニップ部46に所定の制御タイミングにて給送される。

【0066】カセット給紙部47からシートパス51を通して転写ニップ部46に給送される記録材Pはシートパス51の途中に設けたトップセンサー50で先端が認識され、これに同期して感光体ドラム41上に画像が形成される。

【0067】転写ニップ部46にてトナー画像の転写を受けた記録材Pは感光体ドラム41面から順次に分離されてガイド53を通して定着装置54へ搬送され、該定着装置でトナー画像の加熱定着処理を受ける。定着装置54は上記例の誘導加熱装置である。

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【0068】定着装置54をでた画像定着済みの記録材Pは搬送ローラ対55を含むシートバス56を通して排出ローラ対57で排紙トレイ部58に排出される。

【0069】一方、記録材Pに対するトナー画像転写後（紙分離後）に感光体ドラム41上に残留する転写残留トナーや紙粉等の汚染付着物はクリーナー52により感光体ドラム41表面より除去され、表面清掃された感光体ドラム41は繰り返して作像に供される。

【0070】画像形成装置に関して、記録材に対する顕像剤像の形成原理・プロセスは任意である。

【0071】本発明の定着装置には、画像を担持した記録材を加熱して艶等の表面性を改質したり、仮定着する等の像加熱装置も含まれる。

【0072】

【発明の効果】以上説明したように本発明は、被加熱体に近接して配設され、被加熱体に誘導電流を生じさせて発熱させる励磁コイルについて、被加熱体を効率よく発熱させること、かつ被加熱体表面温度を長手方向に渡って均一化すること、しかも簡素な構成により量産性を向上させて低コスト化等を可能にする。またこれにより電磁誘導加熱方式の定着装置および該定着装置を備えた画像形成装置の高性能化、低コスト化等を可能にする。

【図面の簡単な説明】

【図1】 第一の実施例における定着装置の要部の横断面模型図

【図2】 励磁コイルー磁性体コアユニットの一部切欠きの外観斜視図

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*【図3】 励磁コイルー磁性体コアユニットの分解斜視図

【図4】 励磁コイルの作製要領図

【図5】 定着ローラの長手に沿う表面温度分布グラフ

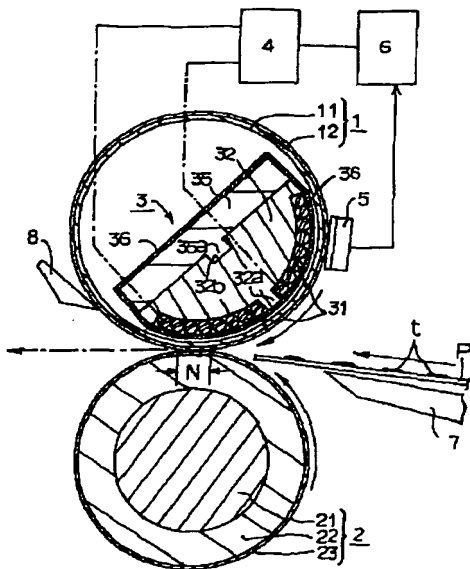
【図6】 第二の実施例における励磁コイルー磁性体コアユニットの分解斜視図

【図7】 第三の実施例における画像形成装置例の概略構成図

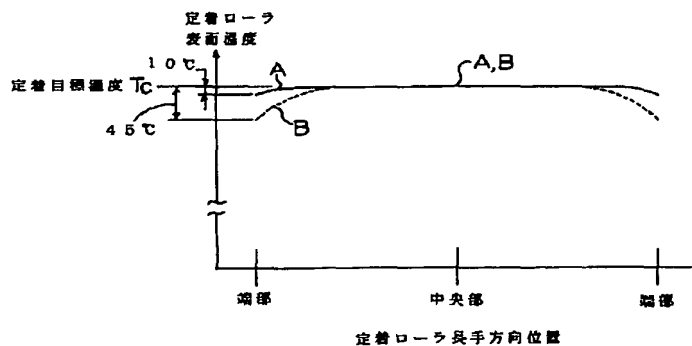
【符号の説明】

- 10 1・・・定着ローラ
11・・・芯金シリンダ（導電層）
12・・・離型層
2・・・加圧ローラ
3・・・励磁コイルー磁性体コアユニット（磁束発生手段）
31・・・励磁コイル
32～34・・・磁性体コア（中央部磁性体コア、端部磁性体コア）
35・・・保持ホルダー
36・・・熱収縮性チューブ
4・・・高周波コンバーター（励磁回路）
5・・・温度センサー
6・・・制御回路
7・・・記録材搬送ガイド
8・・・分離爪
P・・・記録材
* t・・・未定着トナー画像

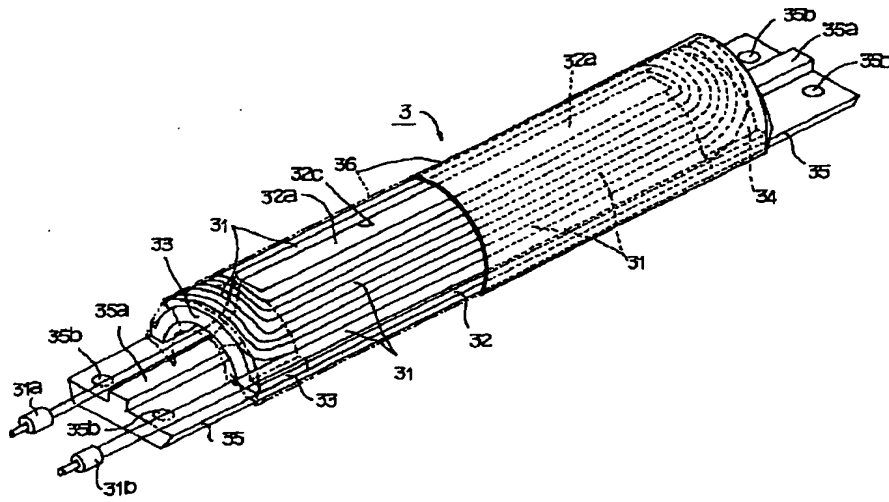
【図1】



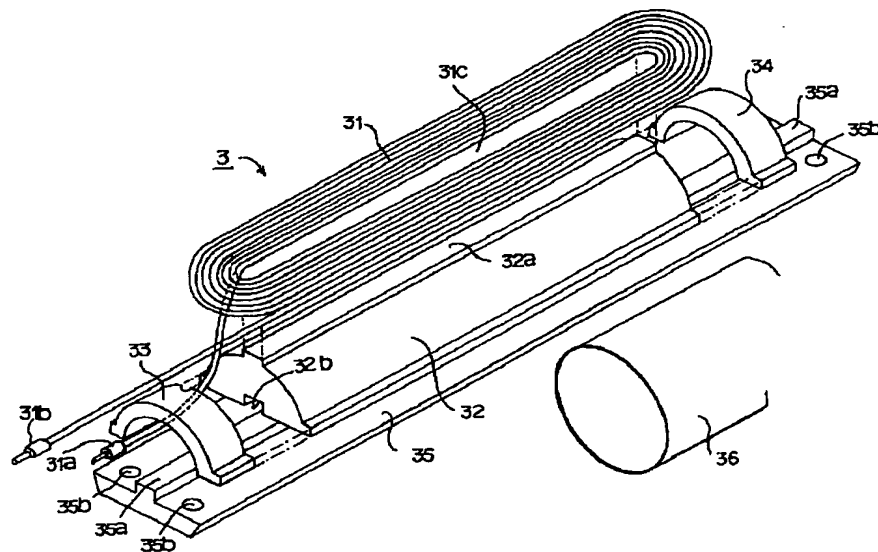
【図5】



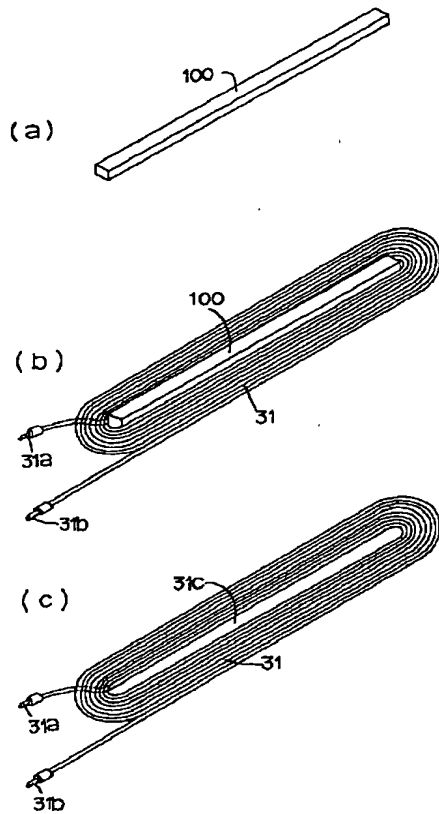
【図2】



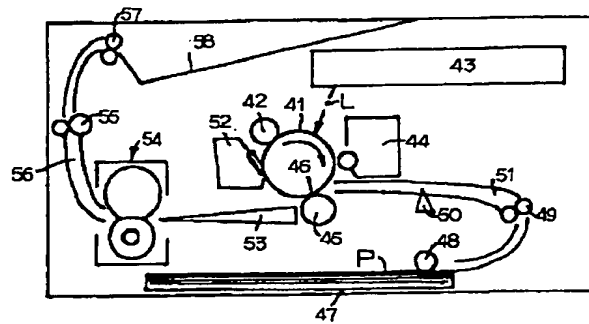
【図3】



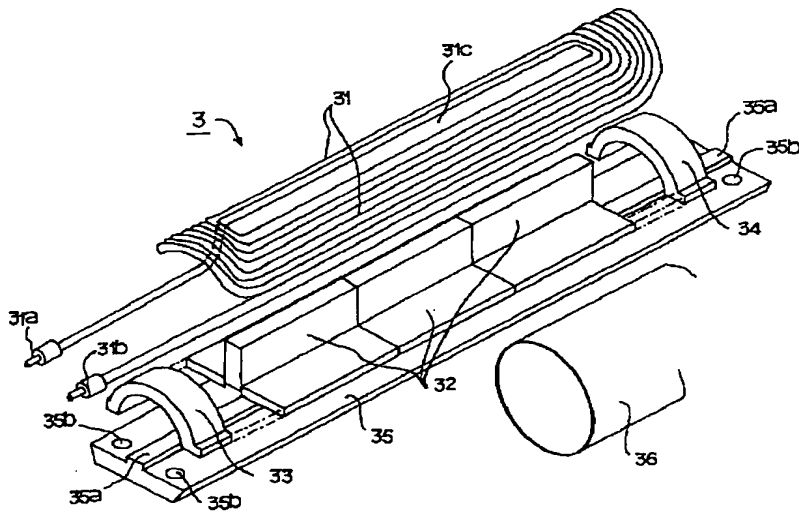
【図4】



【図7】



【図6】



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【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】0071

【補正方法】変更

【補正内容】

【0071】本発明の定着装置には、画像を担持した記録材を加熱して艶等の表面性を改質したり、仮定着する等の像加熱装置も含まれる。